

THE COUNTRY NEEDS COASTAL LIGHTS IN THE SOUTH WEST

The need for new lighthouses on the south west coast to protect local shipping and vessels travelling from Europe to the eastern colonies was noted in 1873 during an Inter-Colonial Conference. Two lights were recommended, one at Cape Naturaliste for the benefit of local industry and one on Cape Hamelin (near Cape Leeuwin) for the benefit of vessels travelling from Europe to eastern Australia. The location of the proposed Hamelin light was later changed to Cape Leeuwin, being a more effective position for guiding shipping.

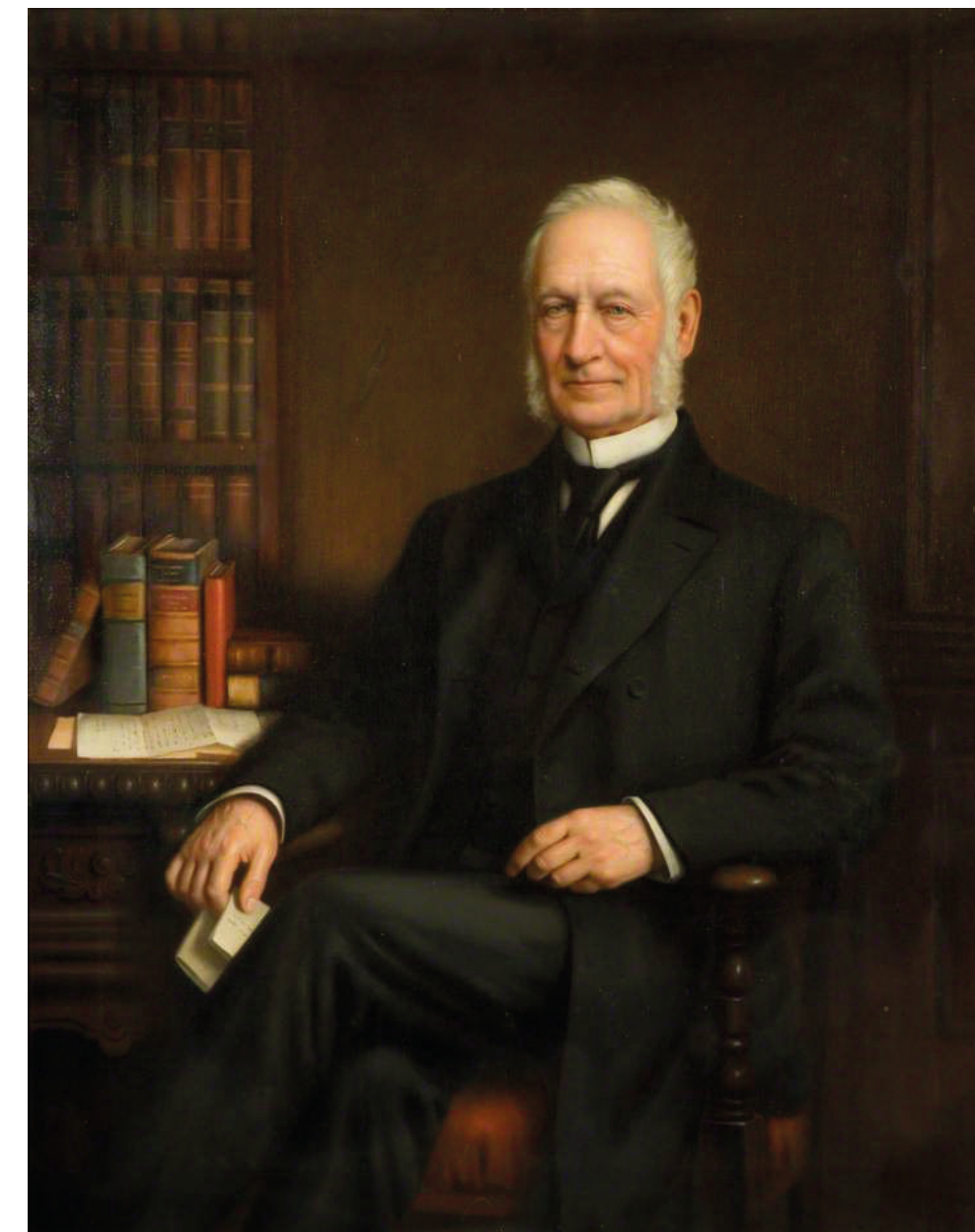
THE CAPE LEEUWIN TOWER

A tall tower was needed to lift the light to its operational position. At 39 metres from foundation to light, the Cape Leeuwin Lighthouse is the tallest stone lighthouse tower on the Australian mainland. The then Premier of Western Australia, John Forrest, laid the foundation stone for the lighthouse in 1895, and returned for the official opening on 10 December 1896.

The lighthouse structures were designed by British consulting engineer, William T. Douglass, and built by local contractors Maurice Davies and John Wishart. The small auxiliary lighthouse shown in the drawing to the left was never built. Stone to construct the tower and the light-keepers' cottages was quarried from nearby 'Quarry Bay'.

ENGINEERING A SOLUTION TO A WATER SUPPLY PROBLEM

The lighthouse and quarters are located on a rocky promontory and have no immediate access to a fresh water supply. However, a ready supply of surface water flows from surrounding scrub onto the beach some distance from the lighthouse. The problem of moving that water to the light-keepers' quarters was solved by installing a pump on the beach, driven by a small water wheel. This allowed the high flow rate of water onto the beach over the wheel to be used to pump a smaller amount of fresh water under pressure to the quarters some distance away and 20 metres higher.



James Timmins Chance 1902
(Portrait by Joseph Gibbs;
Photo: Sandwell Museums
Service Collection)

Chance Brothers adopted this technology too. The Cape Leeuwin Lighthouse was their first implementation of the technology worldwide, with a rotation speed claimed to be twice that of any previous systems. At the time of its installation, the Cape Leeuwin light was the most powerful in Australia and rotated once every 10 seconds to produce a 1/5th second flash every 5 seconds. The lens and mercury flotation systems built and supplied by Chance Brothers remain in operation today, however the flash rate is now once every 7.5 seconds.

A 'CHANCE' TO DEPLOY NEW TECHNOLOGY

The optical apparatus was designed and manufactured by Chance Brothers of the UK. The company initially specialised in 'crown' window glass, supplying glazing for the 'Crystal Palace' to house the Great Exhibition of 1841, the British Houses of Parliament and the four faces of the Westminster clock tower housing 'Big Ben'.

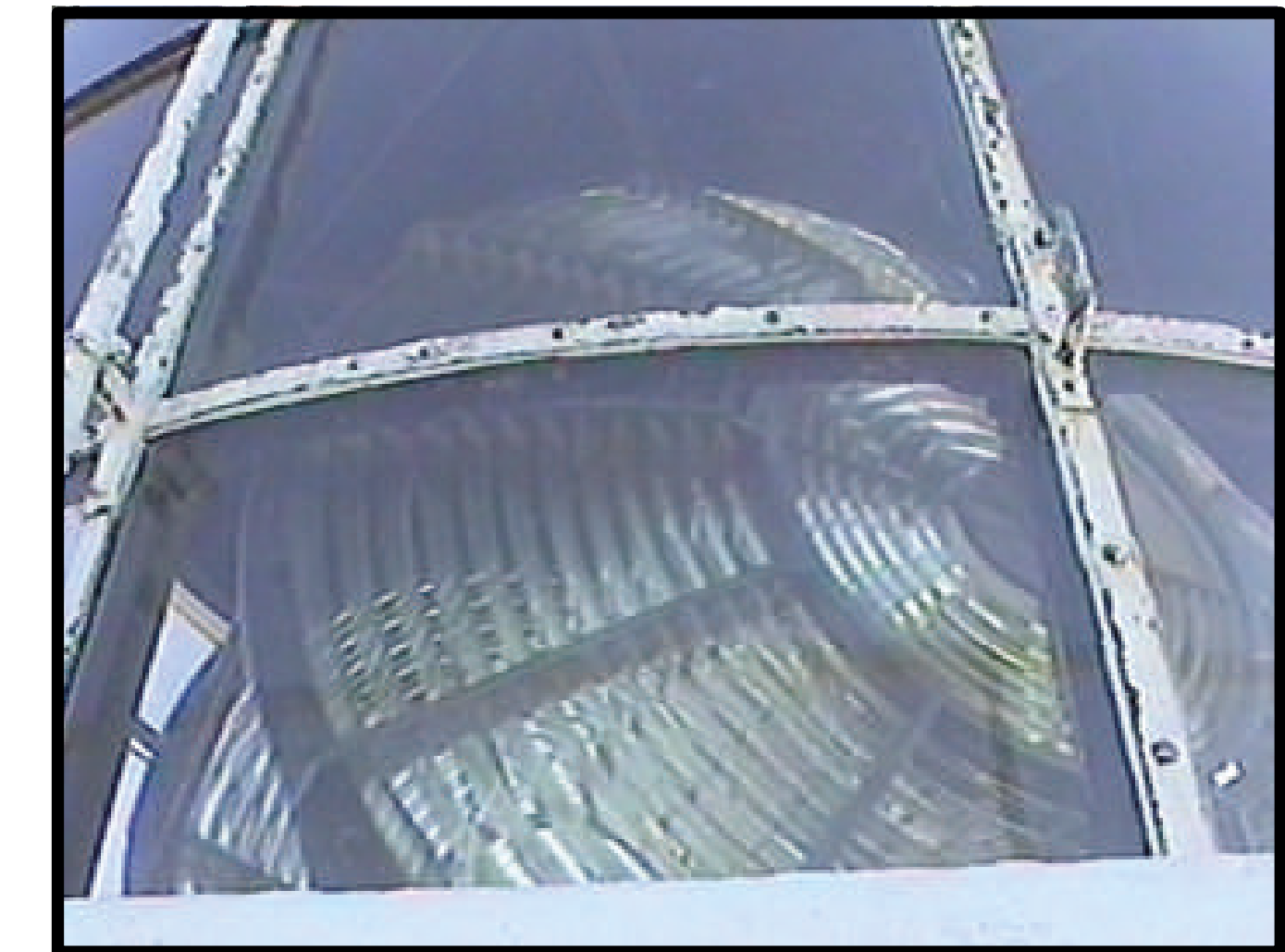
A young member of the family, James Timmins Chance, developed a fascination with the optical qualities of glass and its application in lighthouses, leading the company into the lighthouse optics business.

French optical scientist, Augustin Fresnel, had earlier devised the 'dioptric' lens, consisting of a small central bullseye lens surrounded by an array of concentric segmented prismatic lenses. James Chance adopted the technology and took it further to produce massive lenses to direct a light beam further than ever before.

But large lenses are heavy. How can these be rotated to produce a flashing light? Another French development solved the problem by placing the lens on a turntable suspended on a bath of mercury, reducing friction. The lens was rotated by a clockwork mechanism.

BULLSEYE!

In order to produce a single flash every 5 seconds the Cape Leeuwin lens system consisted of two Fresnel dioptric lenses mounted on opposite sides of the turntable. Illumination came from a kerosene lamp placed at the centre of the turntable. The segmented prismatic lenses and the central bullseye capture the light from the lamp and send it out as a parallel beam, sweeping across the horizon.



The massive Chance Brothers lens, still in operation today.
(Photo: Mark Bush)

EMINENT PERSONS ASSOCIATED WITH THE LIGHTHOUSE

Sir John Forrest, Premier of Western Australia during the 1890s - a strong proponent of the lighthouse system in WA.

James Timmins Chance of Chance Brothers, the firm that supplied the Cape Leeuwin lens system. James Chance led the company into the lighthouse illumination business, dominating lighthouse optics in the British empire for 100 years.

William Tregarthen Douglass - the British consulting engineer who designed the lighthouse.

Maurice Coleman Davies and John Wishart - building contractors who built the lighthouse, quarters and outbuildings, and the water wheel system.

Engineering Heritage National Markers were awarded to the Cape Leeuwin and Cape Naturaliste Lighthouses on 7th December, 2018. The 'National' level of the award acknowledges the engineering innovations employed and the importance of the lighthouses to the development of the whole nation.



William T. Douglass's engineering design drawing, 1894
(State Library WA)



For more details of this and other engineering heritage awards, go to
www.engineersaustralia.org.au/heritageregister/search



The Water Wheel pump, c. 1940 (Photo: State Library WA)